

## Analytical Chemistry

### COMPARISON OF THE FIGURES OF MERIT OF A 27.12 MHZ AND 40.68 MHZ INDUCTIVELY COUPLED PLASMA TIME-OF-FLIGHT MASS SPECTROMETER

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Inductively Coupled Plasma Time-of-Flight Mass Spectrometry (ICP-TOFMS) has been shown to be an effective tool for routine multi-elemental, multi-isotope analysis. Unlike sequential scanning mass spectrometers, TOFMS is a virtually simultaneous mass analyzer that is capable of collecting 20,000 complete mass spectra per second without compromising precision. Furthermore, since all ions that contribute to a given mass spectrum are extracted simultaneously, spectral skew is eliminated. These advantages make ICP-TOFMS a competitive instrument for transient signal analysis.

Since TOFMS is widely used for elemental analysis, understanding how the ICP source itself influences the data obtained is of crucial importance. The ICP is commonly operated at one of the two operating frequencies, 27.12 MHz and 40.68 MHz. Studies comparing these two operating frequencies have shown that some differences exist between the analytical figures of merit. However, these studies have been somewhat conflicting because they have employed different RF generators, load coils, or mass analyzers. The presence or absence of a secondary discharge can also complicate this comparison, as shown in previous quadrupole MS studies. The LECO Renaissance TOFMS employed in this study has the capacity to eliminate secondary discharge typically present in the first stage region. Additionally, the RF generator employed here can operate at either 27.12 MHz or 40.68 MHz. As a result of these attributes, a direct,

unambiguous, comparison between the characteristics of these two operating frequencies can be obtained.